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1 of 1

DOE/BC/14960--5

3rd Quarter, Fiscal Year 1994

POST WATERFLOOD CO2 MISCIBLE FLOOD IN LIGHT OIL, FLUVIAL - DOMINATED DELTAIC RESERVOIRS.

DE - FC22 - 93BC14960

TEXACO EXPLORATION AND PRODUCTION INC.

JULY 15, 1994

Award Date: June 1, 1993.
Completion Date: December 31, 1997

Government Award for Current Fiscal Year

$ 1,081,850.89

Project Manager	(Texaco)	Sami Bou-Mikael
COR	(DOE)	Chandra Nautiyal
Contract Specialist	(DOE)	John Augustine

Reporting Period : April 1, 1994 Though June 30, 1994

TABLE OF CONTENTS

DISCLAIMER

POST WATERFLOOD CO_2 MISCIBLE FLOOD IN LIGHT OIL FLUVIAL DOMINATED DELTAIC RESERVOIRS"

"DE-FC22-93BC14960"

TECHNICAL PROGRESS REPORT
3rd QUARTER, 1994.

EXECUTIVE SUMMARY.

production from the Port Neches CO_2 continue to improve. five wells responded to CO_2 injection and currently flowing with the exception of well #6, which has been placed on gas lift to draw the CO_2 to the vicinity. Current production is about 400 BOPD from the five producing wells. Total CO_2 injection is averaging 10 MMCFD, including 4 MMCFD purchased from Cardox and 6 MMCFD of recycled gas. Reservoir pressure increased from 2697 psi in May, to 2890 psi in June due to over-injection. An additional water injection pump was installed to handle the increasing volume of produced water. Also a workover was performed on Well # 33 to take out the gas lift valves and eliminate communication.

Two papers were presented at the SPE/DOE symposium that was held in tulsa this april. The screening model has been released to the DOE and was made public during the month of May.

3rd QUARTER (1994) OBJECTIVES.

The objectives for the third quarter of 1994 as stated in the previous quarterly report and their status are as follow:

* Continue to inject CO_2 in all wells to distribute the gas throughout the reservoir and allow maximum contact with the remaining oil.

This objective has been achieved by injecting the CO_2 in three wells: # 7, #36 and 1-H. While water is being injected in two wells located on the periphery of the reservoir: # 17 and # 10. Recently we switched water and CO_2 injection between the center and the peripheral wells, except for the horizontal well that remained a CO_2 injector. On one hand this will improve the sweep efficiency and reduce the excess gas production from high GAR wells, on the other hand it will stimulate well #6 area of the reservoir. Also consideration is given to the idea of placing the center wells on production, provided we maintain a balanced withdrawal rate and stable reservoir pressure. This idea will be evaluated using the reservoir model prior to field implementation.

* Monitor production response, reservoir pressure, oil and gas analysis, water injection and radioactive tracers to optimize production and build a more effective reservoir model.

The reservoir performance is monitored on a daily basis by the field and office personnel to ensure prudent and safe operations. produced and injected fluids are monitored in order to maintain a balanced withdrawal rate (Fig 1) and operate the reservoir near or at the MMP. Reservoir pressure, fluid analysis and tracer analysis are also monitored bimonthly, and can be accelerated if deemed necessary. A new AGA-8 equation has been introduced to improve the accuracy of the electronic metering of gaseous CO_2. Plots of the production and yield vs. time are kept for the reservoir and on well by well basis as shown in figures 2 - 8. The above data collected in addition to the 3-D surveys will be used to build a new and improved compositional model. By building a strata model to account for reservoir heterogeneity (K, θ and sand distribution), integrating reservoir and geological data, the compositional model will be more useful to predict future reservoir performance.

* Continue our modeling efforts to improve the compositional model by building a strata model to account for reservoir heterogeneity in K, θ and sand distribution.

Texaco intended to utilize the compositional model to assist in project operations and as a predictive tool for input in the economic model for strategic and tactical planning. For this reason, continuous improvement of the compositional model is a part of the ongoing effort in that direction. Utilizing advanced technology such as 3-D seismic, workbench and Stratamodel software, Texaco's engineers and geoscientists will refine the reservoir model to match production history and predict future reservoir performance.

Texaco's geoscientists are currently developing the Stratamodel that fully describe and characterize the reservoir utilizing well information from logs and other wellbore attributes to determine sand development and reservoir properties distribution, in order to predict the reservoir fluid flow behavior.

DISCUSSION OF RESULTS - FIELD OPERATIONS.

The reservoir pressure measured in well # 6 has increased from 2697 psi to 2890 psi over a two months period. This was coupled by a production increase from 300 BOPD to 400 BOPD. However, monthly production was adversely affected because of the down time

on well #33 due to communication. A workover was performed on the well during the month of May to pull the tubing and remove the gas lift valves to correct communication. Also well #6 was placed on gas lift in an attempt to draw the CO_2 front to the well and establish early production. The pumping capacity for produced water has been increased to 3000 BWPD. This will have an impact on improving our oil production capacity, and prevent loss of reservoir pressure.

the following is a list of the most recent well tests taken on June 18, 1994 for all producing and injection wells:

Khun #15R	143	BOPD,	584	BWPD,	1919	MCFD,	15	CHOKE,	1160 TBG.
KHUN #38	66	BOPD,	484	BWPD,	170	MCFD,	34	CHOKE,	140 TBG.
Khun #33	156	BOPD,	819	BWPD,	3018	MCFD,	29	CHOKE,	910 TBG.
Stark #8	26	BOPD,	78	BWPD,	1680	MCFD,	12	CHOKE,	1010 TBG.
Khun #6	0	BOPD,	140	BWPD,	20	MCFD,	48	CHOKE,	110 TBG.
Khun #14	45	BOPD,	1455	BWPD,	920	MCFD,	34	CHOKE,	590 TBG.

Marg Area 1#1H	3803	MCFD,	1390	TAG,	48	CHOKE,	
STARK #7	1145	BWPD,	1600	TAG,	OL	CHOKE,	
KHUN #36	4069	MCFD,	1400	TAG,	48	CHOKE,	
KHUN #17	1242	BWPD,	1740	TAG,	48	CHOKE,	
STARK #10	3746	MCFD,	1460	TAG,	37	CHOKE,	

Average production and injection volumes for this quarter are:

Oil Production:	371	BOPD,
Water Production:	3004	BWPD,
Gas Production:	5736	MMCFD,
Water Injection:	2170	BWPD,
CO_2 Injection:	9423	MMCFD.
Net Injection:	844	RBPD.

DISCUSSION OF RESULTS - TECHNOLOGY TRANSFER.

Texaco has presented two papers at the recent SPE/DOE symposium in Tulsa. Also, as a part of the technology transfer plan Texaco held several presentations in Midland area, concerning the use of the screening model. Participants from other major and independent oil companies were present (appendix A). The screening model has been released to the DOE and the public in late May 1994.

SAIC is continuing its work on the environmental regulations and constrains facing CO_2 projects of this type. this topical report should be published before the end of the year. Louisiana State University is gathering information on Fluvial Dominated Deltaic Reservoirs, using the Louisiana office data base that was provided in the first 1994 quarterly report.

4th QUARTER (1994) OBJECTIVES.

* **Alter the injection pattern of the CO_2 and water injection wells to contact the majority of the reservoir oil, to achieve optimum recovery, and to improve sweep efficiency.**

Well 17 inject about 5 MMCFD CO_2 (to stimulate well Khun #6).
Well 1H inject 2.5 MMCFD CO_2.
Well 10 inject 2.5 MMCFD CO_2.
Well 36 inject 1500 BWPD.
Well 7 inject 1500 BWPD.

Alternating water and CO_2 will assist in reducing the mobility of the CO_2 an improve the sweep efficiency of the reservoir. We are currently considering one Huff-Puff cycle on well Khun #6 if it does not respond to co_2 in well Khun #17.

* **Continue to monitor production response, reservoir pressure, oil and gas analysis, water injection and radioactive tracers to optimize production and to build a more effective reservoir model.**

* **Build a detailed strata model to use it in the development of the improved compositional model. The**

* **Adjust the production forecast if necessary, based on actual reservoir performance.**

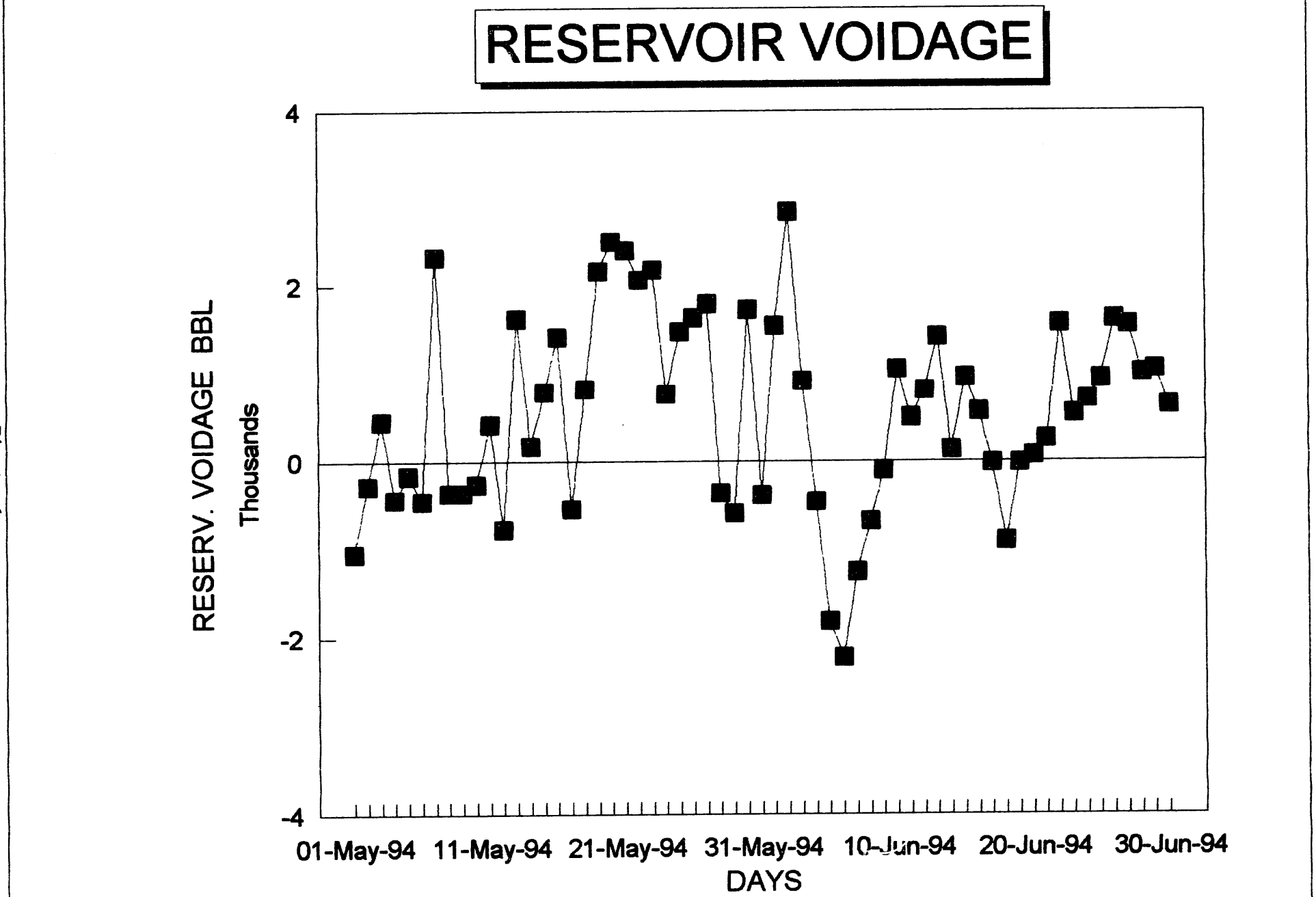
RESERVOIR VOIDAGE
RESERV. VOIDAGE BBL
Thousands
4
2
0
-2
-4
01-May-94
11-May-94
21-May-94
31-May-94
10-Jun-94
20-Jun-94
30-Jun-94
DAYS

Figure 1
5

Port Neches CO2 Project
Allocated Production

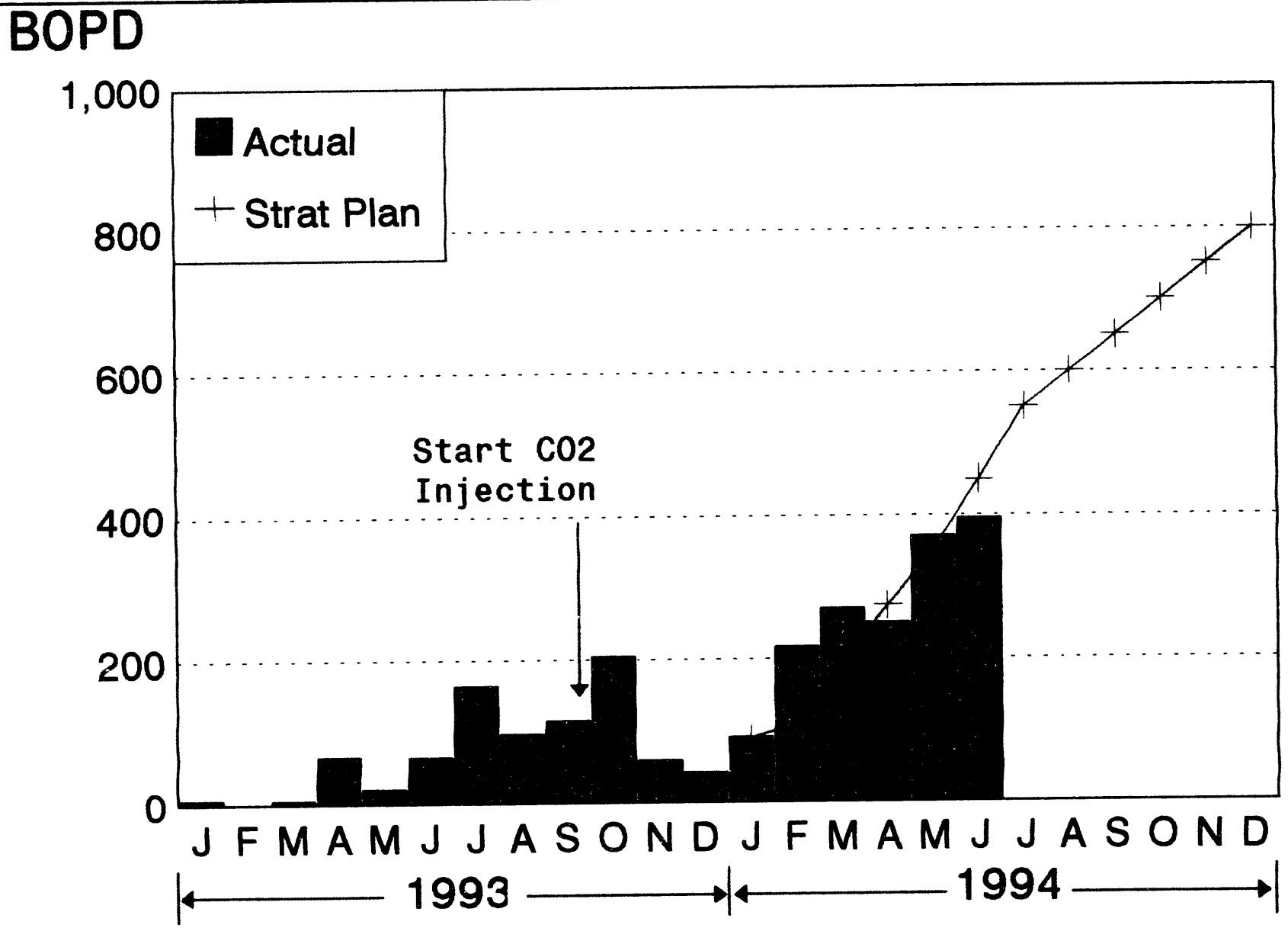

Figure 2
6

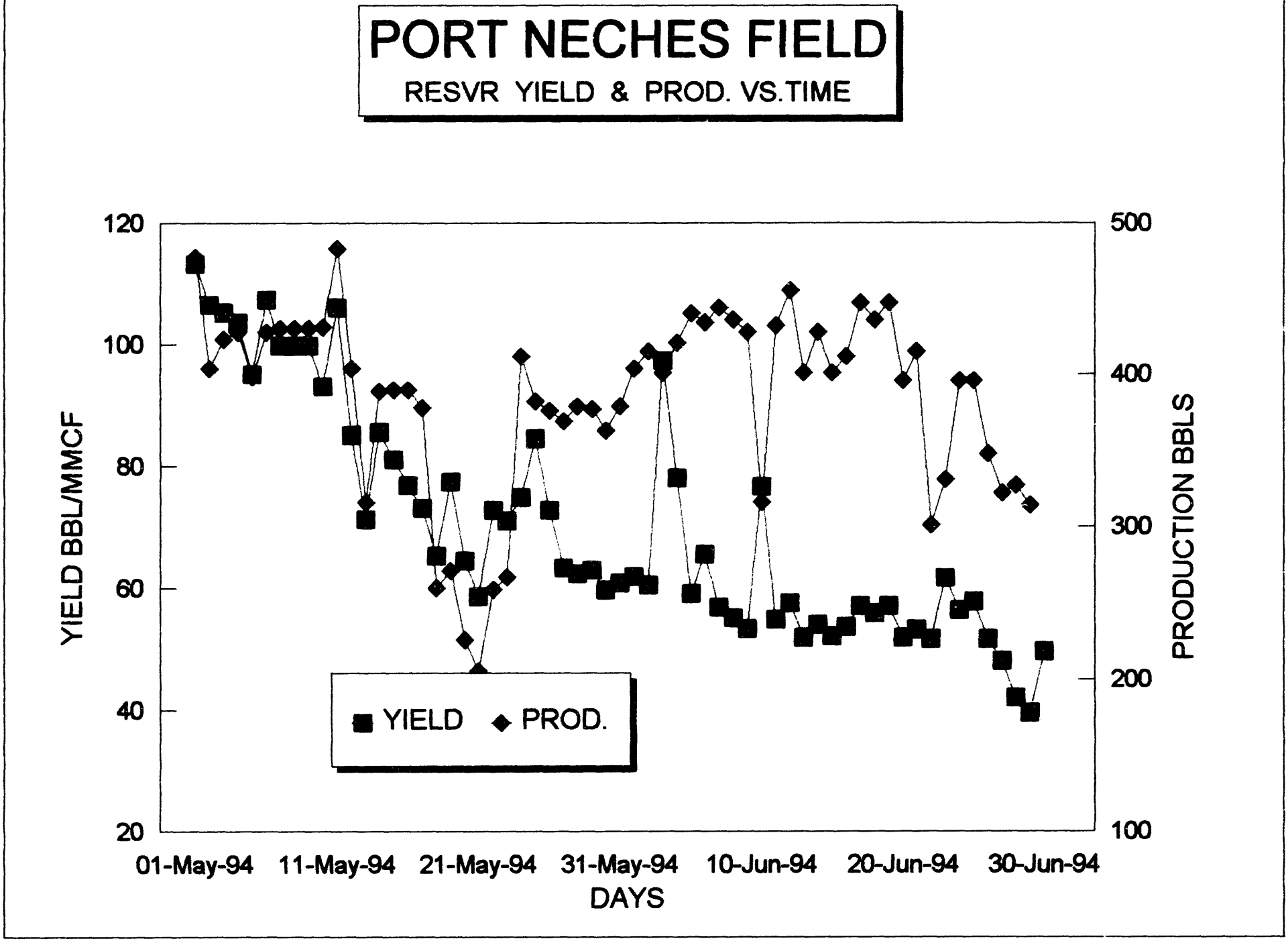
PORT NECHES FIELD
RESVR YIELD & PROD. VS.TIME
YIELD BBL/MMCF
PRODUCTION BBLS
120
100
80
60
40
20
500
400
300
200
100
YIELD
PROD.
01-May-94
11-May-94
21-May-94
31-May-94
10-Jun-94
20-Jun-94
30-Jun-94
DAYS

Figure 3
7

PORT NECHES FIELD

WELL #38 YIELD & PROD. VS.TIME

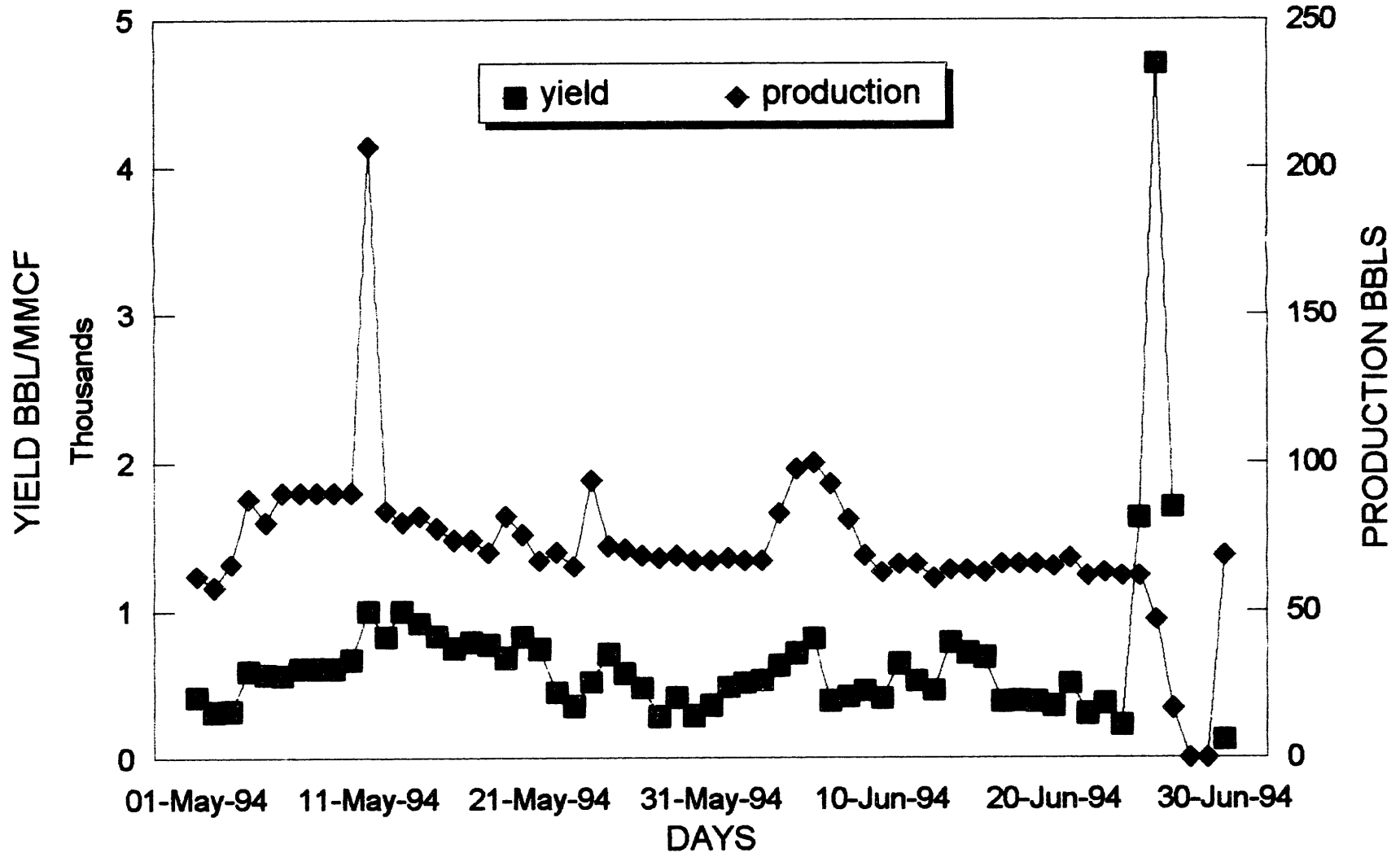

Figure 4

PORT NECHES FIELD

WELL #33 YIELD & PROD. VS.TIME

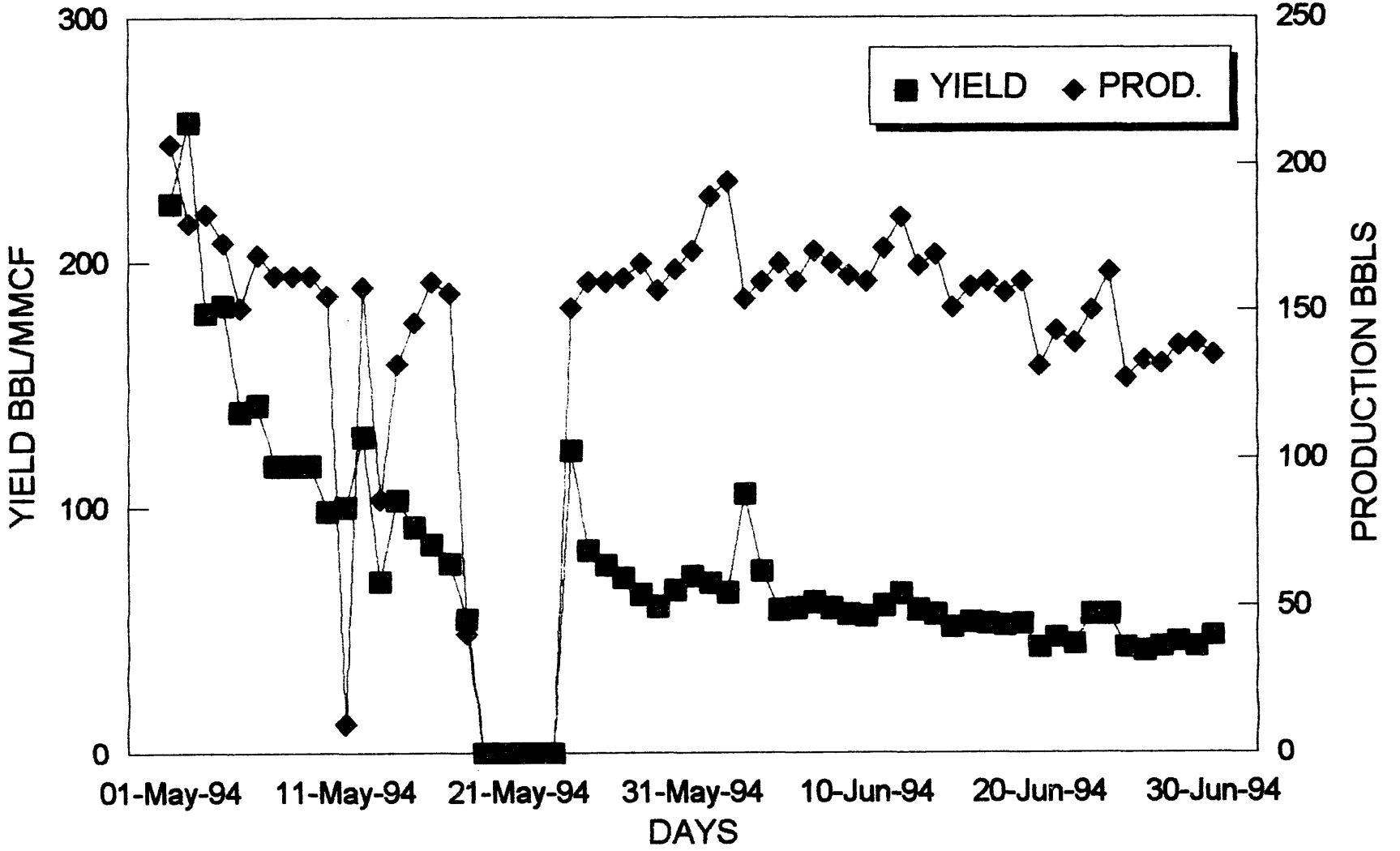

Figure 5

PORT NECHES FIELD

WELL #15R YIELD , PROD. VS.TIME

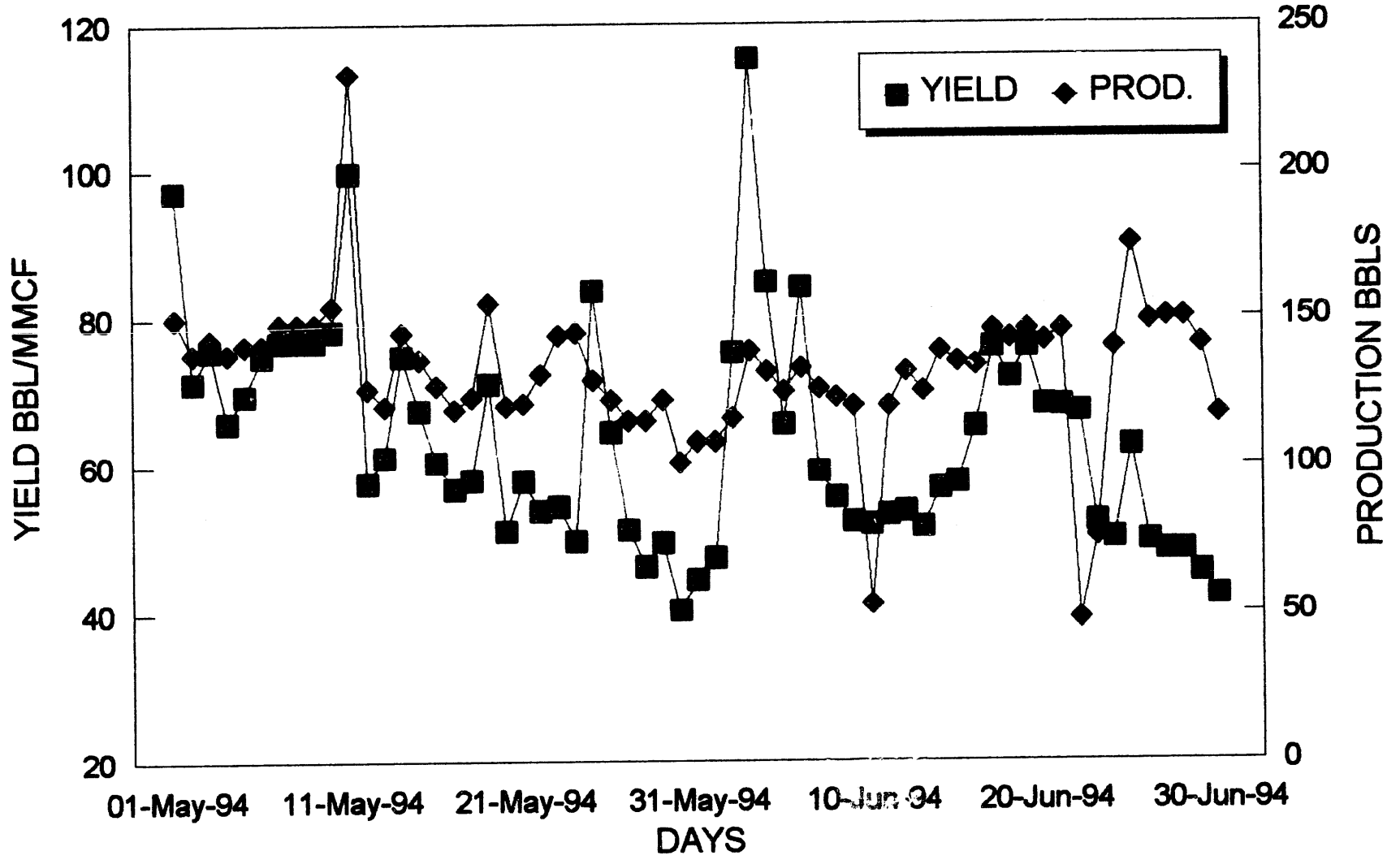

Figure 6
10

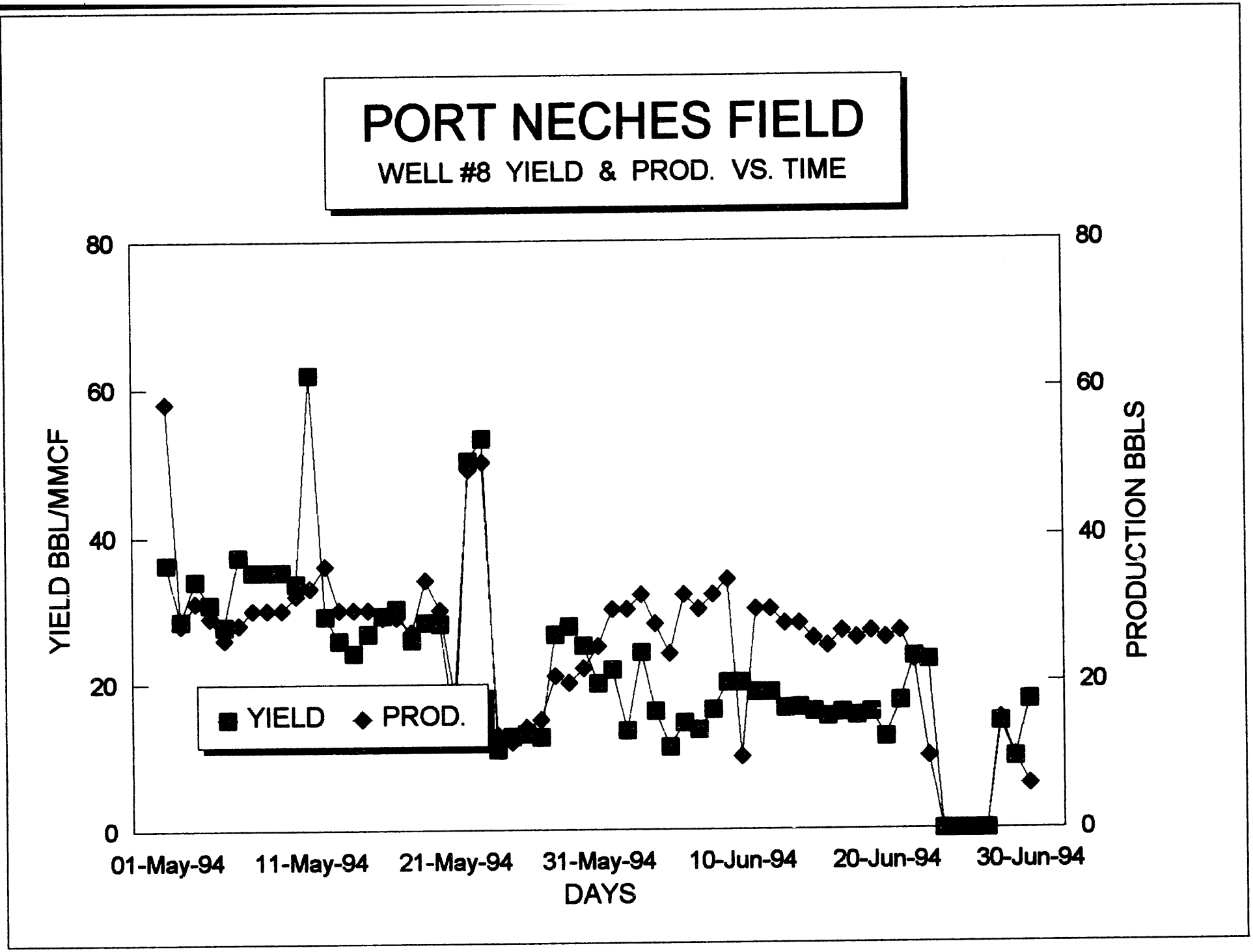
PORT NECHES FIELD
WELL #8 YIELD & PROD. VS. TIME
YIELD BBL/MMCF
PRODUCTION BBLS
80
60
40
20
0
YIELD
PROD.
01-May-94
11-May-94
21-May-94
31-May-94
10-Jun-94
20-Jun-94
30-Jun-94
DAYS

Figure 7
11

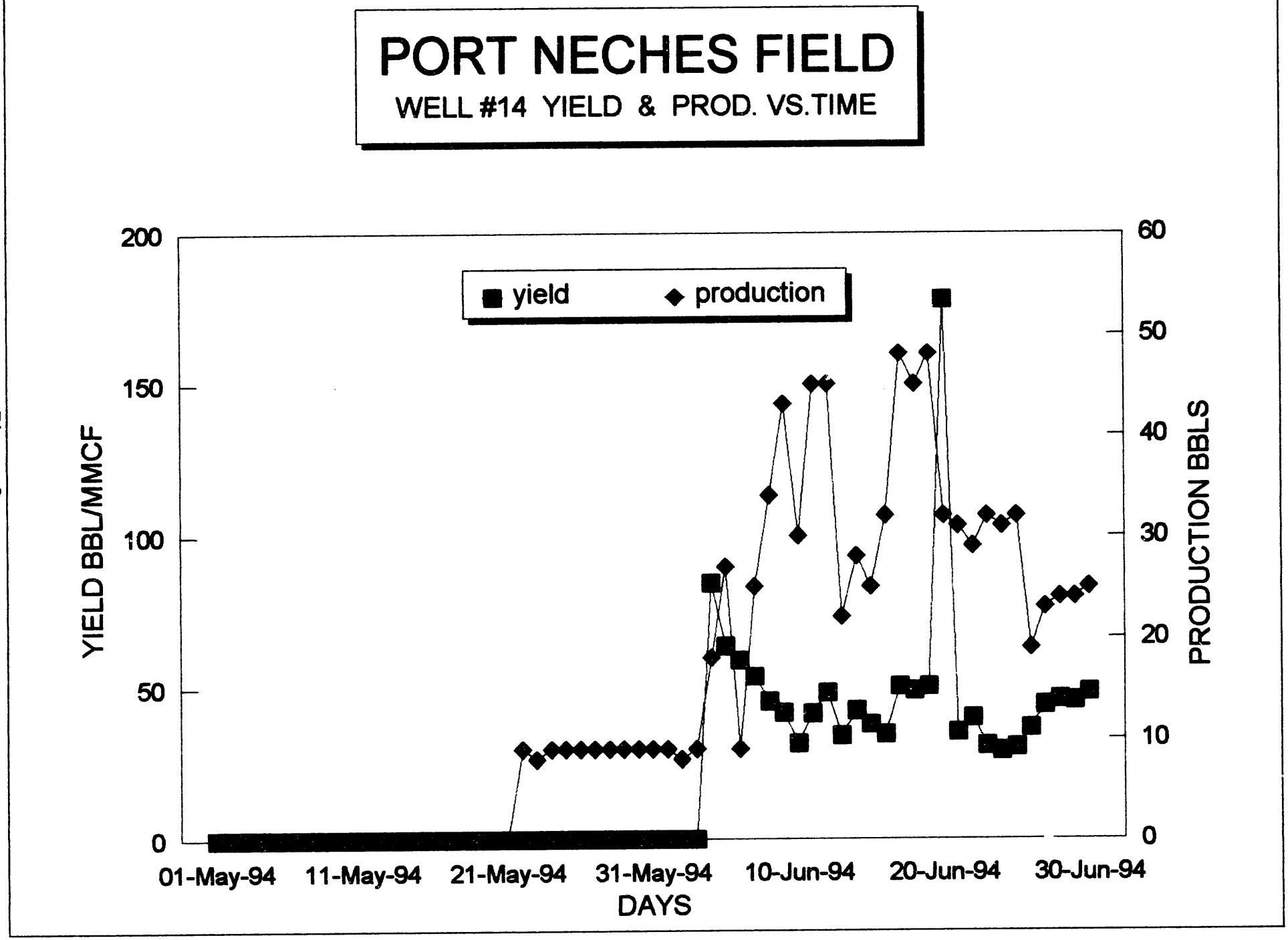
PORT NECHES FIELD
WELL #14 YIELD & PROD. VS.TIME
yield
production
YIELD BBL/MMCF
PRODUCTION BBLS
200
150
100
50
0
60
50
40
30
20
10
0
01-May-94
11-May-94
21-May-94
31-May-94
10-Jun-94
20-Jun-94
30-Jun-94
DAYS

Figure 8
12

U.S. DEPARTMENT OF ENERGY

MILESTONE SCHEDULE [ ] PLAN [X] STATUS REPORT

DOE F1332.3
(11-84)

FORM APPROVED
OMB NO. 1901-1400

1. TITLE	2. REPORTING PERIOD	3. IDENTIFICATION NUMBER
Post Waterflood CO2 Miscible Flood in a Light Oil Fluvial Dominated Deltaic Reservoir	**Apr. 1, 1994 – Jun. 30, 1994**	**DE-FC22-93BC14960**

4. PARTICIPANT NAME AND ADDRESS	5. START DATE	6. COMPLETION DATE
Texaco Exploration and Production Inc. **400 Poydras St.** **New Orleans, LA 70130**	**June 1, 1993**	**December 31, 1997**

7. ELEMENT CODE	8. REPORTING ELEMENT	9. DURATION CURRENT FISCAL YEAR 1993												FY 1994				FY 1995				FY 1996	FY 1997	10. PERCENT COMPLETE	
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q			a. Plan	b. Actual
1.1	Geologic & Engineering	1																						100%	100%
1.2	Extraction Technology	2																						100%	100%
2.1	Recording Daily Production										3												A	40%	40%
2.2	Reservoir Charac-terization										4			B				C						45%	45%
2.3	Site Operation & Field Work							D				5	E					F						80%	80%
2.4	CO2											6												30%	30%
2.5	EH&S Monitoring & Compliance								G	H		7											I	40%	40%
3.1	CO2 Screening Model														J	8								100%	100%
3.2	Environmental Analysis																	9						40%	40%
3.3	FDD Database & Model																	K				10		10%	10%
3.4	Technical Publications																						11	40%	40%

11. SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

U.S. DEPARTMENT OF ENERGY
MILESTONE SCHEDULE [ ] PLAN [X] SCHEDULE
(ATTACHMENT)

DOE F1332.9 ATTACHMENT
(11-84)

1. TITLE	2. REPORTING PERIOD	3. IDENTIFICATION NUMBER
Post Waterflood CO2 Miscible Flood in a Light Oil Fluvial Dominated Deltaic Reservoir	**Apr. 1, 1994 – Jun. 30, 1994**	**DE-FC22-93BC14960**
4. PARTICIPANT NAME AND ADDRESS **Texaco Exploration and Production Inc.** **400 Poydras St.** **New Orleans, LA 70130**		5. START DATE **June 1, 1993** 6. COMPLETION DATE **December 31, 1997**

MAJOR EVENTS	DATE	DESCRIPTION	STATUS
1	10/15/92	TASK 1.1 – GEOLOGICAL RESERVOIR DESCRIPTION AND LAB TESTS	COMPLETED
2	10/15/92	TASK 1.2 – PHASE 1 RESERVOIR SIMULATION	COMPLETED
3	08/01/93	TASK 2.1 – RECEIVE DOE APPROVAL TO INJECT CO2	COMPLETED
4	08/01/93	TASK 2.2 – RESERVOIR PRESSURE IS RAISED TO 2700 PSI BY WATER INJECTION	COMPLETED
5	08/15/93	TASK 2.3 – CO2 INJECTION AND PRODUCTION FACILITY IS COMPLETED	COMPLETED
6	08/15/93	TASK 2.4 – CO2 PIPELINE IS INSTALLED	COMPLETED
7	08/15/93	TASK 2.5 – NEPA CATEGORICAL EXCLUSION IS RECEIVED	COMPLETED
8	12/31/95	TASK 3.1 – SPE PAPER AND RELEASE OF CO2 SCREENING MODEL	COMPLETED
9	12/31/94	TASK 3.2 – TOPICAL REPORT ON ENVIRONMENTAL CONSTRAINTS	PROJECT 40% COMPLETE
10	12/31/95	TASK 3.3 – TOPICAL REPORT ON FDD DATABASE	PROJECT 10% COMPLETE
11	12/31/97	TASK 3.4 – SPE PAPER ON RESERVOIR CHARACTERIZATION	1ST SPE PAPER PRESENTED

INTERMEDIATE EVENTS	DATE	DESCRIPTION	STATUS
A	12/31/97	TASK 2.1 – FINAL PROJECT REPORT	TO BE COMPLETED DURING 1997
B	12/31/93	TASK 2.2 – UPDATED RESERVOIR MODEL COMPLETED	COMPLETED
C	12/01/94	TASK 2.2 – CONVENTIONAL CORE ANALYZED IN POLK "B" #39 WELL	TO BE PERFORMED DURING 1995
D	04/30/93	TASK 2.3 – 10 WELL WORKOVER PROGRAM COMPLETED	COMPLETED
E	10/01/93	TASK 2.3 – HORIZONTAL CO2 INJECTION WELL DRILLED, POLK "B" #2 W/O PERFORMED	HORIZ. WELL COMPLETE, POLK "B" W/O CANCELLED
F	12/01/94	TASK 2.3 – VERTICAL CO2 INJECTION WELL DRILLED (POLK "B" #39)	TO BE DRILLED DURING 1995
G	06/10/93	TASK 2.5 – PERMIT FOR CO2 PIPELINE RECEIVED FROM ARMY CORPS OF ENGINEERS	COMPLETED
H	06/30/93	TASK 2.5 – HAZARDOUS SUBSTANCE PLAN SUBMITTED TO DOE	COMPLETED
I	12/31/97	TASK 2.5 – FINAL HAZARDOUS SUBSTANCE PLAN SUBMITTED TO DOE	TO BE COMPLETED DURING 1997
J	12/31/94	TASK 3.1 – CO2 SCREENING MODEL FINAL REPORT SUBMITTED TO DOE	COMPLETED
K	12/31/94	TASK 3.3 – FDD DATABASE STUDY IS COMPLETED BY LSU	LSU WORK WILL BE COMPLETED IN SPRING, 1995

11. SIGNATURE OF PARTICIPANT'S PROJECT MANAGER AND DATE

budget removed, dk

DATE
FILMED
10/6/94
END